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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,290	08/30/2001	Charles Lin	HT01-001	6636

28112 7590 06/10/2004

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EXAMINER

OMETZ, DAVID LOUIS

ART UNIT	PAPER NUMBER
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2653

DATE MAILED: 06/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/942,290

Applicant(s)

LIN, CHARLES

Examiner

David L. Ometz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-19 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

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1. Claims 2, 10 are objected to because of the following informalities: in claim 2, line 2, "a" should be changed to --said--; in claim 10, line 5, --is-- should be inserted before "coplanar"; in claim 10, line 17, "it" should be changed to --the cavity--. Appropriate correction is required.
2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3, 6-10, 16, 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Crue et al (US Pat Pub 2004/0061973).

As per claim 1, Crue et al shows a read-write head for a magnetic disk in figures 1-3, comprising: a read head 50 between two magnetic shields 52/54; a write head (30/38/40/44) for perpendicular magnetic recording including a write pole 30 and a flux return pole 38; and said write pole providing, together with said flux return pole, complete flux closure, whereby magnetic flux returned to the write pole does not flow through either of said magnetic shields (due to the separated nature of the shield 52 and return pole 38).

As per claim 3, the read-write head described in claim 1 wherein the write pole and the flux return pole are separated by a distance that is large enough to allow an inherent optimum vertical field profile.

As per claims 6-8, the read-write head described in claim 1 wherein said read head is a SV GMR type, MTJ, or CPP GMR type read head (see paragraph 41).

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As per claim 9, the read-write head described in claim 1 wherein a write coil 44 is located between the write pole and the flux return pole.

As per claim 10, Crue et al shows a read-write head for a magnetic disk, comprising: a read head 50, having inner and outer edges, inherently optimized for reading perpendicularly recorded data in a magnetic medium; the read head disposed to lie between upper and lower shielding layers 52/54, each shielding layer 52/54 having an edge that is coplanar with said read head outer edge (i.e. the edge facing the air bearing surface); a first spacer layer on said upper shielding layer (un-marked in figure 3); on said spacer layer a first magnetic layer 38, having an outer edge, that functions as a write pole for perpendicular magnetic recording; on said first magnetic layer 38 a second spacer layer (again un-marked but shown in figure 3)); on said second spacer layer, a thin film coil 44; on the second spacer layer and the thin film coil, a third spacer layer (again un-marked); on the third spacer layer a second magnetic layer 68 having an outer edge; said outer edges of the read head, the first magnetic layer, and the second magnetic layer all lying in a single plane; a cavity (filled by magnetic layer 40) that extends from the first magnetic layer 38, through the second and third spacer layers, to the second magnetic layer 68; the cavity being disposed so that said thin film coil lies between it and said single plane (i.e. ABS plane); and said cavity being filled with a third magnetic layer 40 that contacts both the first and second magnetic layers.

As per claim 16, the read-write head described in claim 10 wherein the second magnetic layer 68 has a thickness between about 1 and 3 microns (see paragraph 44).

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As per claim 18, the read-write head described in claim 10 wherein the second magnetic layer 68 is selected from the group consisting of NiFe, CoNiFe, CoFeB, CoNiV, and CoNiMo (see paragraph 43).

4. Claims 1, 3, 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Yano et al (US Pat Pub 2002/0036871).

As per claim 1, Yano et al shows a read-write head for a magnetic disk in figures 1-3, comprising: a read head 32 between two magnetic shields 31/33; a write head for perpendicular magnetic recording including a write pole 35 and a flux return pole 34; and said write pole providing, together with said flux return pole, complete flux closure, whereby magnetic flux returned to the write pole does not flow through either of said magnetic shields 31/33 due to the separation "L" between the shield 33 and the pole 34.

As per claim 3, the read-write head described in claim 1 wherein the write pole and the flux return pole are separated by a distance that is inherently large enough to allow an optimum vertical field profile.

As per claim 9, the read-write head described in claim 1 wherein a write coil 36 is located between the write pole and the flux return pole.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 11-15, 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crue et al. Crue et al shows a vertical recording head with a shielded MR read head wherein the

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MR read head is shielded by two separate shields independent from the write head portion as noted, *supra*. However, Crue et al does not show wherein the shielding layers are selected from the group consisting of NiFe; wherein the first spacer layer has a thickness between about 1.5 and 4 microns; wherein the first magnetic layer has a thickness between about 1 and 3 microns; wherein the second and third spacer layers have a thickness between about 0.5 and 3 microns; and wherein the first and third magnetic layers are selected from the group consisting of NiFe, CoNiFe, COFeB, CoNIV. and CoNiMo.

With regard to the shielding layers, first, and third magnetic layers being NiFe, the examiner takes Official notice that the use of NiFe shield and pole layers to shield MR read heads and to write onto magnetic media is old and well known in the art of magnetic sensors. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use NiFe as the shield and pole material because of it's ease of formation and high saturation properties which allow effective shielding to the MR read head from detrimental stray magnetic fields and large magnetic fields in the write pole which permit effective writing of "1s" and "0s" to high coercive media.

With regard to the claimed thicknesses for the spacers and first magnetic layer, although Crue et al is silent as to the particular thicknesses of these layers, the scale used for the formation of the head is on the micron level as evidenced by the second pole being about 2 microns. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the head with such thicknesses for the layers as this is akin to optimizing the values of a result effective variable (in this case the thicknesses effect the overall height of the sensor, the degree of insulation between magnetic layers, and the effectiveness of the return pole

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to absorb flux from the underlayer of the magnetic media). Therefore, determining the optimal value of a result effective variable would have been obvious and ordinarily within the skill of the art. **In re Boesch**, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980).

7. Claims 2, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. Yano et al shows a vertical recording head with a shielded MR read head wherein the MR read head is shielded by two separate shields independent from the write head portion as noted, *supra*. However, Yano does not show wherein the write pole is between about 3.5 and 6 microns from a read head and wherein the write pole is between about 3.5 and 7 microns from the flux return pole. Although Yano et al is silent as to the particular claimed distances between these layers, the scale used for the formation of the head is on the micron level as evidenced by the distance "L" being about 2 microns. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the head with such thicknesses for the layers as this is akin to optimizing the values of a result effective variable (in this case the distances permit enough separation between the read and write heads without making the head too large overall). Therefore, determining the optimal value of a result effective variable would have been obvious and ordinarily within the skill of the art. **In re Boesch**, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980).

8. Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The references cited all show vertical recording heads with shielded MR read heads.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Ometz whose telephone number is (703) 308-1296.

The examiner can normally be reached on M-W, 6:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (703) 305-6137. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David L. Ometz  
Primary Examiner  
Art Unit 2653

DLO  
6/8/04